MP45B-02

Analysis of Extended Layups of Commercial Vessels Operating in California Waters: Implications for Vessel Fouling and Species Introductions

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ABSTRACT

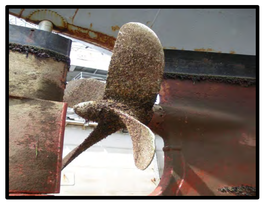
The current global economic downturn has had a severe impact on worldwide trading and commercial shipping. The current study evaluates the impact of a slowdown in trading on the commercial fleet operating in California and the implications for increased accumulation of fouling organisms and potential introductions of nonindigenous species into California. This fleet of vessels has experienced a large increase in the number and duration of extended layups over the past several years. This trend has been seen across nearly all vessel types operating within the state, with containerships, unmanned barges, and auto carriers exhibiting the greatest proportional increases. When these ships reenter service, they have the potential to pose significant risk, which may be altered by certain husbandry practices. These data will be used to help inform management decisions on reducing nonindigenous species introductions via vessel fouling.

INTRODUCTION

Nonindigenous species (NIS) are typically described as organisms introduced into an area where they do not naturally or historically occur. Introductions of NIS can occur through a variety of mechanisms, or vectors, with fouling of commercial vessels regarded as one of the most important vectors for introductions into coastal North America (Fofonoff et al. 2003). Within California, fouling of the submerged surfaces of vessels is responsible for 20 – 62% of the introductions into the San Francisco Bay and for 53 – 90% of the introductions into the Los Angeles/Long Beach Port complex (Davidson et al. 2010).

There are many factors that influence the extent, diversity, and condition of the fouling community on commercial ships. It is believed that the longer and more frequently a ship remains in a single area, the more likely it is to potentially accumulate fouling organisms on its submerged surfaces (Floerl and Inglis 2005). Unfortunately, reports of increased numbers of commercial ships being anchored and laid up across the world have become commonplace over the past year - one side effect of the current world economic downturn. Reports indicate that the number of idled ships across the world has reached over 11% of the global containership fleet and over 10 % of the global bulker fleet (The Maritime Executive 2009, Floerl and Coutts 2010). One of the potential implications for this is that the idled ships, likely to be heavily fouled, will return to service when economic conditions improve, thus transporting their associated fouling communities to coastal ports across the globe.

While the increase in layups for the global commercial fleet has been well documented throughout the current economic downturn, the effect on the fleet operating within a given geographical range may be more useful for local resource managers to evaluate the potential impact to their waters. This current study includes an evaluation of the recent increase in the number and duration of extended idled periods for commercial ships that operate in California, as well as a breakdown by vessel type and layup location.



METHODS

❖Since January 2008, the California State Lands Commission (Commission) has been collecting information on the hull husbandry practices and fouling-related voyage characteristics of the commercial fleet operating in California through mandatory annual submission of the Commission's Hull Husbandry Reporting Form.

❖One of the Reporting Form questions requires the vessel owner/master to report the duration (days), arrival date, and location of each occurrence where the vessel remained in a single location for ten or more days since the hull and submerged surfaces were last clean (e.g. since dry docking).

❖The results are presented according to the year of report submission (i.e. 2008 or 2009), which does not necessarily represent the actual year of the extended idle period.

- ❖Vessels are reporting the idle periods that have occurred since the submerged surfaces were last clean, which may have been up to five years prior to submission.

❖Therefore, although many of the extended idle periods reported in the 2009 submissions did occur during late 2008 and 2009, these values aren't meant to represent the total number during each given year.

RESULTS

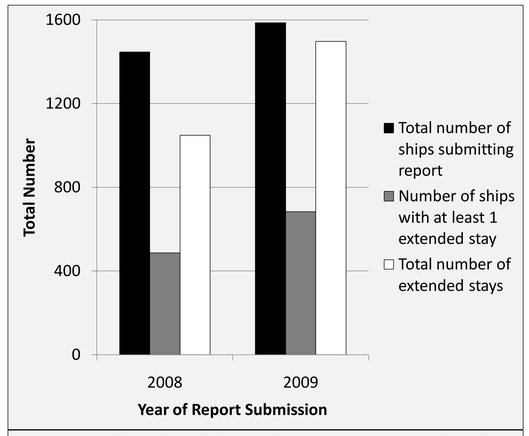


Figure 1. Total number of ships submitting reports, total number of ships reporting at least one extended port stay of ten or more days, and total number of extended port stays of ten or more days, all reported in 2008 and 2009.

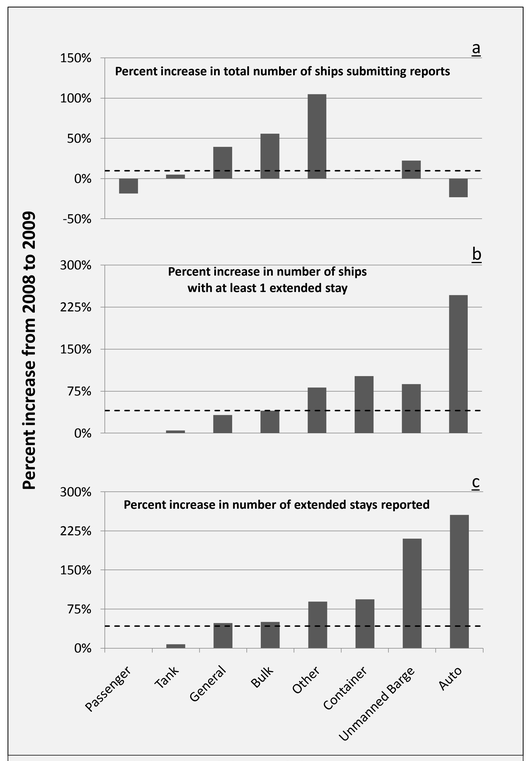


Figure 2. Vessel class breakdown of the percent increase from 2008 to 2009 reporting forms for a) total number of ships submitting reporting form; b) total number of ships reporting at least one extended stay of 10 days or greater; and c) total number of extended stays of 10 days or greater. For each figure, the dashed line represents the percent increase for the entire CA fleet.

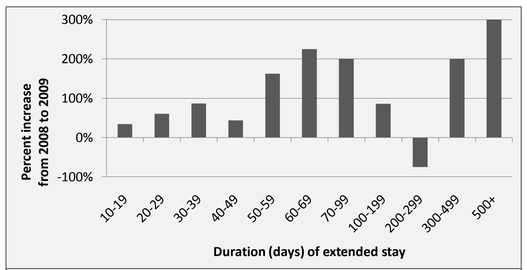


Figure 3. Percent increase in the number of extended port stays of given duration.

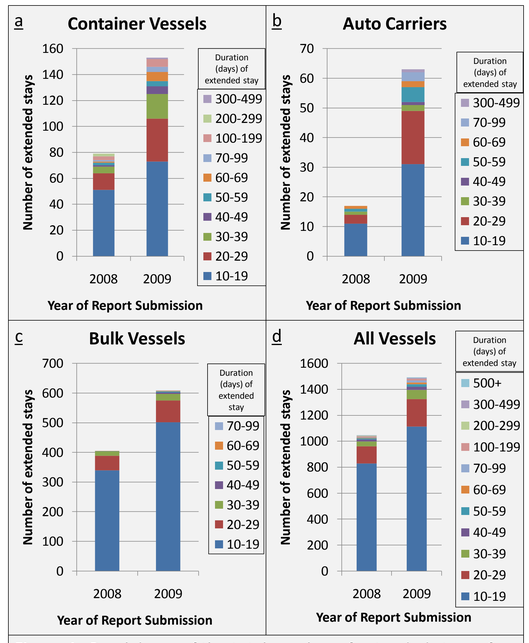


Figure 4. Breakdown of the total number of extended stays of given duration for a) container vessels; b) auto carriers; c) unmanned barges; and d) bulk vessels.

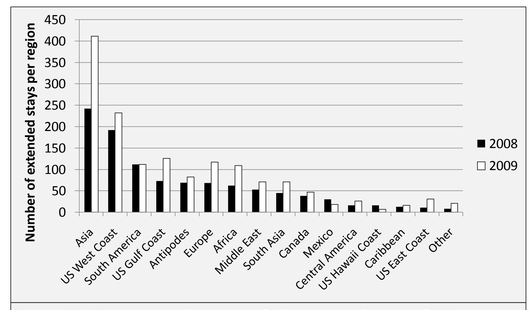


Figure 5. Geographic location of all extended stays of 10 or more days from report submission in 2008 and 2009.

❖The number of ships reporting at least one extended stay of ten or more days increased by 40.5% and the total number of extended stays increased by 42.1%, based on reporting forms submitted in 2008 and 2009 (Figure 1).

- ❖These increases are not entirely due to an increase in the number of vessels submitting reports, as report submission increased to a much lesser extent (9.7%; Figure 1).

❖Seven of eight vessel classes exhibited an increase in both the total number of ships reporting at least one extended stay of ten or more days (Figure 2b) and the total number of extended stays of ten or more days (Figure 2c).

- ❖Auto carriers exhibited increases of over 240% for both categories(Figures 2b, 2c), despite a 23% decline in the total number of auto carriers submitting reporting forms (Figure 2a).

❖Although the majority of extended stays were 10-19 days in duration (Figure 4d), layups of 60-69 days, 70-99 days, 300-499 days, and 500+ days all increased by over 200% (Figure 3).

❖Reports of auto carriers remaining idle for 20-29 days increased six-fold, from 3 (2008 submissions) to 18 (2009 submissions; Figure 4b).

❖Asian ports and anchorages represent the most common region for extended layups. Overall, this region experienced a 70% increase in the number of extended layups (Figure 5), including a 105% increase in containership layups.

DISCUSSION

The downturn in the global economy over the past few years has had a major effect on international trade and shipping, resulting in the need to temporarily remove large portions of the global fleet from service. For the California fleet, the number of ships reporting extended idle periods and the total number of extended idle periods have each increased by more than 40% over the two years of reporting. These increases were present for nearly every vessel class; passenger ships were the only vessel category that did not change from reporting year to reporting year. Bulkers and tankers account for the majority of the extended idle periods but they exhibited only modest increases from 2008 report submissions to 2009. Containerships, unmanned barges, and auto carriers experienced much sharper increases in the number of idle periods.

The majority of these extended stays were less than 20 days in duration, although nearly every duration range examined exhibited increased occurrences, particularly layups of 50-99 days as well as 300 days and above.

This increased level of inactivity fleetwide may increase the likelihood of heavily fouled ships operating within California, increasing the risk of transporting and introducing NIS. However, because of the effect increased levels of fouling have on a vessel's drag and fuel consumption, many owners may opt to remove the fouling organisms from their ships after an extended layup. This may be accomplished by dry docking the vessel to completely remove organisms from all submerged surfaces and to reapply an appropriate antifouling coating. However, this option is costly and dry docks in locations where these ships are laid up may not have the capacity to accommodate a large number of ships. Another option is to clean the submerged surfaces of the ship while in water. This option may remove organisms from the smooth surfaces of the hull, but the equipment typically used does not allow for cleaning of heterogeneous surfaces or intakes and gratings, areas that typically harbor high density and diversity fouling communities (Coutts and Taylor 2004, Sylvester and MacIsaac 2010). A third option would be to do nothing and continue trading.

From a resource management point of view, these three options represent a gradient of risk abatement. Dry docking the vessel is the only way to completely remove the risk of introduction after an extended layup, while in-water cleaning may remove some (but not all) of the fouling organisms, and the third option to do nothing will likely present the greatest risk to California waters.

Current California law requires that vessels remove fouling organisms from the submerged surfaces at least every five years. If a vessel is nearing the end of its 3-5 year inter-dry docking period, it may be cost-effective to go into dry dock after a layup. Under other circumstances, however, it will be up to the vessel owner to decide how to manage the fouling load that may have accumulated during the layup, balancing the cost to remove the organisms and increased fuel costs due to drag.

Although California law requires the regular removal of fouling organisms, there is currently no provision to remove them after an extended layup, when risk may be elevated. The information gathered through the Commission's Hull Husbandry Reporting Form and presented here provides insight into vessel behaviors such as this and when used in conjunction with fouling-related research funded by the Commission, will enable the development of sound, science-based management policies to reduce or prevent the introduction of NIS into California waters through the fouling of commercial ships.

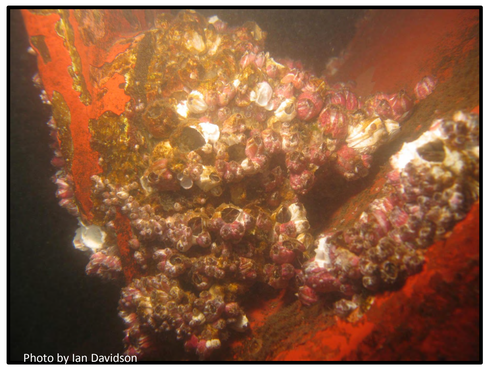


Photo by Ian Davidson

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